

On the Occurrence of two Species of *Cumacea* in New Zealand.
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(PLATES XVI.—XVIII.)

HITHERTO no species of Crustacea belonging to the suborder Cumacea have been described from New-Zealand waters. This might be considered somewhat remarkable, considering the attention which has been paid to the whole group, until it is remembered that nearly all the collections hitherto made have been gathered on the coast-line, or from shallow waters within sheltered bays or inlets. My own dredgings, from the Bay of Islands in the north to the inlets of Stewart Island in the south, have never been taken from a greater depth than 15 fathoms. During the 'Challenger' Expedition the dredge was used at two stations, No. 168, off Cape Turnagain, in 1100 fathoms, and No. 169, off East Cape, in 700 fathoms. At both of these stations various species of Crustacea were obtained, but no Cumacea. Even in Australian waters no species of this group were recorded until the publication in 1887 of the Report on the Cumacea of the 'Challenger' Expedition by Prof. G. O. Sars. This Report contains the description of three species of *Cyclaspis*, one from the entrance to Port Phillip in 38 fathoms, and two from Flinders Passage, between Australia and New Guinea, both taken at a depth of 7 fathoms. So far as I know, these are the only Cumaceans described from Australian seas.

In December, 1883, I had a couple of days' dredging in the Bay of Islands, in the northern portion of this colony, but had no opportunity for a long time of working out any of the material collected. On sorting out, however, I found that a few specimens of Cumaceans were among my finds, belonging to the two genera *Cyclaspis* and *Diastylis*. In June of last year (1890) I did a little surface-netting at night in Otago (Dunedin) Harbour, and obtained a few immature specimens of the same species of *Cyclaspis*. No doubt, when more systematic examination of the bottom of our seas and of those round Australia is made with the dredge, other forms and in greater abundance of individuals will be brought to light.

Both forms described in this paper appear to me to be quite distinct from any other species of the genera hitherto known. A feature in which they differ from all species yet described, excepting *Cyclaspis pusilla*, Sars, is the total absence of spines, or other epidermal growths, and of sculpturing on the carapace.

CYCLASPIS LEVIS, n. sp. (Plates XVI. & XVII. figs. 1-26).

Specific Characters.—Carapace somewhat laterally compressed, keeled above and slightly gibbous, smooth, destitute of ridges or sculpturing. Ocular lobe hardly visible. Eye not made out (wanting?). Body slender, tapering gradually to the tail; dorsal ridge distinct, lateral ridges almost wanting. First pair of legs with basal joint elongated and produced into a long acute appendage; remaining five joints about as long as the base; last joint with four spines. Second pair of legs as long as or longer than the third; terminal joint armed with six serrated spines. Uropoda with the branches subequal and rather shorter than the scapes, with a fringe of setæ along the inner edge.

Length of largest specimen 8 millim.

Seen from above, the form of the body is rather slender, and tapers gradually and uniformly from the carapace to the tail. Looked at from the side, the carapace is considerably dilated, and is evenly rounded on its upper surface. The "pseudorostral projection" (of Sars) is short, pointed upwards, and sub-obtuse. The length of the carapace is about one fourth that of the whole animal, exclusive of the uropoda. The whole surface of the body is remarkably free from ridges or prominences. The integument is marked throughout by small rounded scale-like thickenings. The colour (in spirit-specimens) is nearly white, without any pigment-spots.

The four exposed segments of the thorax behind the carapace are somewhat broader than the caudal segments, and are connected with each other by flexible membranous spaces; the epimera are rounded both anteriorly and posteriorly. The abdominal segments are longer than the thoracic, and are nearly uniform in length, except the penultimate, which is the longest. The relative length of all the body-segments on the dorsal line from the front of the carapace to the end of the tail is as follows:—

	Four visible thoracic segments.	Six abdominal segments.
Carapace.	4, 5, 11, 8	14, 14, 15, 14, 20, 13
39		

As in *C. australis* each segment is furnished on its antero-lateral margin with an acute knob-like process, which fits into and hinges with a notch on the posterior margin of the preceding segment.

The *antennulæ* (Pl. XVI. fig. 4 *a*¹) bear a general resemblance to the same organs in *C. australis*, having a 3-jointed peduncle, of which the basal joint is large and broad in comparison with the two which succeed it. The flagellum also is 2-jointed, and bears at its extremity two long setæ. Of the second flagellum, which occurs in a rudimentary form in other species of the genus, I have failed to find any trace in this species.

The *antennæ* (Pl. XVI. fig. 4 *a*²) in the female are rudimentary, consisting of a broad base bearing on its inner face two plumose setæ, and—at the extremity of its distal part which projects almost at right angles from its proximal end—tapering to a small conical joint tipped with three minute setæ. In the male (fig. 5) the antennæ are furnished with a basal joint, with which the rest of the organ articulates at right angles. The distal portion of the peduncle consists of two joints, of which the second is nearly three times as long as the first, and bears a very long multi-articulate flagellum. In the specimen figured, in which it is evident that a portion has been broken off, the flagellum is about four times as long as the base, and is divided into 45 articulations, each tipped with a few minute setæ. There is nothing of the vermiform appearance which Sars describes and figures as characterizing the antennæ of the young male of *C. australis* examined by him.

The *mandibles* (fig. 6) are extremely brittle, and hence are difficult to dissect without breaking. The right mandible has its anterior or cutting-branch ending in a single strongly indurated tooth, behind which, on the inner margin, is a comb-like row of curved setose spines. The left mandible has the same branch ending in two strong teeth or projections, of which the outer and larger is itself formed of four blunt teeth. In each mandible the molar tubercle stands nearly at a right angle to the cutting-branch.

The *first maxillæ* resemble the same organs in *C. australis*, having two masticatory lobes, of which the outer is the broader, and is armed with about eight spines, while the slender inner one has four curved spines. The palp is long and very narrow, and bears two long extremely slender setæ; it projects backwards from the base of the outer masticatory lobe.

The *second maxillæ* are two-jointed, the basal portion being the larger. Its outer margin is nearly straight (not expanded as in *C. australis*), while its inner margin forms a rounded cutting-edge, fringed with numerous setæ. The second segment is also fringed with setæ, which are so numerous as to make it difficult to distinguish the plate-like palp, which is also setose on its margin.

The *maxillipeds* have their outer portion curved inwards, so that each appears like two plates standing alongside of and at right angles to one another. The general appearance of these organs is very similar to those of *C. australis*. The basal portion bears on its inner edge *seven* longish setæ, of which the anterior four are more or less plumose. The palp (Pl. XVII. fig. 11) is 4-jointed, the third joint bearing on its inner edge a row of stout bidentate teeth. The narrow penultimate joint bears two plumose spines at its outer angle, while the minute terminal joint ends in three short spines. The *branchial apparatus* is difficult to dissect out on account of its extremely fragile nature; it resembles the corresponding organ in *C. australis*, but the branchiæ themselves are longer than are represented in the figures of that species in the 'Challenger' Cumacea.

The *first gnathopods* (fig. 12) are 5-jointed. The basal joint is about twice as long as all the remaining four; it is elongated in shape, its length being four times as much as its greatest breadth; near the extremity of its outer edge it bears a row of (about eight) slender spines, and on its extremity two plumose setæ, one on each side, and a few slender spines. The second joint is destitute of setæ. The third has one plumose seta on its outer extremity, and a row of about seven on its inner margin. The penultimate joint has three spines on its inner extremity, and one plumose seta on its outer. The last joint is small and narrow, and bears one strong and several slender spines at its extremity.

The *second gnathopods* (figs. 13 and 14) are more than twice as large as those of the first pair. The basos is more than twice as

long as those succeeding it; it is elongated and produced on its outer margin into a long acute lamella, which bears a row of spines on its inner edge. The ischium bears a row of short plumose setæ on its inner margin, and has its outer extremity produced into a blunt curved lamella which ends in a single plumose seta. The meros is very short, and bears only one or two setæ. The two remaining joints are bent almost back on the meros (fig. 14), so that their structure can hardly be made out until they are dislocated: the propodos ends in a strong spine and two or three short setæ. The exopodite of this limb is about half the length of the gnathopod, and, exclusive of the base, is 7-jointed; each of the joints bears two long beautifully plumose setæ.

The *first pair of legs* (fig. 15) exhibit a modification of the structure which characterizes the three pairs of limbs anterior to them. The prolongation of the basos is very slender and acute; it shows the coarse granular structure described by Sars as occurring in *C. australis*, and is destitute of setæ or spines, as indeed are all the joints except the last. The ischium is not produced as it is in the second gnathopods, while the remaining joints are elongated and slender; the last bears a few setæ at its extremity.

The *four pairs of ambulatory legs* diminish gradually in size posteriorly, and are not very dissimilar in form. In the specimen dissected the relative lengths were 1 mm., 0·93 mm., 0·87 mm., and 0·71 mm. In the first of these (*second pair of legs*) the basos is long and narrow, the ischium is very short and bears a long plumose spine at its extremity; the meros, which is somewhat longer, also bears a plumose spine; the carpos has three spines at its extremity, each of which is finely pectinated or toothed along one of its margins (fig. 16); the dactylos is nearly twice as long as the propodos, and ends in three strong spines.

The *pleopoda* are wanting in the females, as usual in the Cumacea. In the males five pairs are present, and are very similar in form, the last pair being somewhat the smallest. Each pair consists of a strong basal joint and two branches (figs. 20-24). The basal joint is about three times as long as it is broad, and bears on its inner edge, near the middle, a short row of spines which are curiously serrated at their apex. The outer branch is 2-jointed, the last joint being oval in shape and fringed round its end with long setæ.

The inner branch is a 1-jointed plate-like lamella, nearly as long as the outer, and fringed with long setæ on the inner margin and round the extremity.

The *uropoda* (fig. 25) are twice as long as the last abdominal segment and are 2-branched; on their inner edge they bear a line of fine setæ. The outer branch of each is 2-jointed, but only indistinctly so; the first joint is very short; the second is long, acutely lanceolate in form, and bears a row of fine setæ along the inner margin. The inner branch is 1-jointed, shorter than the outer, acutely tapering in form, and bears on its inner edge a row of setæ which gradually pass into short spines.

Habitat. Bay of Islands, taken with the dredge in 8 fathoms; Otago Harbour (Dunedin), a few very immature specimens taken with a surface-net.

DIASTYLIS NEO-ZEALANICA, n. sp. (Plate XVIII. figs. 1-11).

Specific Characters. (Female.)—Carapace slightly compressed, scarcely narrowed behind, arched above, about twice as long as rest of body; surface quite smooth, destitute of spines; pseudo-rostral projection conical, somewhat arched above. No eye? Telson conical, spinous on both sides. Uropoda with the scape about twice as long as telson, slender; branches subequal, about half as long as scape, 3-jointed; inner branch with the joints subequal, outer with the terminal joint exceeding the two proximal.

Length of largest specimen 8 millim.

The carapace is not quite twice as long as the exposed part of the trunk; its width is only slightly diminished in the posterior portion, while the first exposed joints of the hind part of the body are very narrow. It is somewhat distinctly 6-jointed, and when seen from the side (Pl. XVIII. fig. 1) it has, especially in the front portion, a sinuous outline, while the pseudo-rostral projection is somewhat arched above and produced into a short conical beak. In the dorsal aspect (fig. 2) the carapace is seen to be acutely pointed, the rostrum appearing like a cone.

The tail is somewhat longer than the anterior part of the body, and is laterally flattened; each segment is produced backwards on the lateral line into a blunt projection. The relative lengths of these segments in the dorsal line are as follows:—

1.	2.	3.	4.	5.	6.
11	11	14	21	29	21

The integument is smooth over the whole body, and exhibits a distinct reticulation under the microscope (Pl. XVIII. fig. 3). Its colour (in my spirit-specimens) is a uniform white without any pigment-spots.

Owing to the imperfect preservation of the only adult specimen, the antennal and oral parts could not be satisfactorily made out. The *mandibles* are of normal form, that of the right side having the molar process more strongly toothed than in the left.

The *first gnathopods* (fig. 4) are slender, and have the basos nearly smooth, except the extremity of the outer edge, which bears a few short bristles, and the anterior margin, which has a few long plumose setæ. The remaining five joints are all more or less furnished with plumose setæ. The ischium and carpos bear each on their outer extremity a very long plumose seta.

The *second gnathopods* (fig. 5) are half as long again as the preceding pair, and more than twice as broad. The basos is long and broad, and bears on its inner edge a row of strong bristles. At its outer extremity it is furnished with a double row of long plumose setæ, which extend nearly as far as the end of the limb. The exopodite (with its setæ) does not quite reach to the end of the basos; it is 7-jointed, and ends in numerous long setæ.

The *legs of the first pair* (fig. 6) are very long, exceeding the carapace, and about equalling the length of the whole cephalothoracic portion of the body. The basos is long and curved outwards, smooth on the upper edge, which is terminated by two long setæ, and furnished on the lower edge with a row of simple setæ; its anterior margin bears a single tooth. The ischium and meros are very short, subequal, and nearly smooth. The three remaining joints are very slender and elongated; the carpos is quite destitute of setæ, while the two following joints have only a few long slender simple setæ on their lower margin. The exopodite only reaches with the end of its setæ a little past the extremity of the basos. Its basal joint, as well as the basos of the limb itself, appears under a moderate power of the microscope as if covered with finely imbricating scales. The same markings appear on the next two pairs of limbs.

The *legs of the second pair* are about two thirds as long as those preceding them, and are somewhat similarly formed; but the setæ on the inner margin of the basos are all beautifully plumose. The exopodite is also relatively much longer, its setæ reaching to the extremity of the carpal joint. The *legs of the third pair* are shorter but relatively stouter than the second pair, but, as usual, have no exopodite. While the ischium is very short, the carpos is about as long as the basos. The last two joints are very short, and are nearly hidden by the long setæ at the end of the carpos. The *legs of the fourth pair* (fig. 9) have their joints diminishing in length towards the extremity; all the joints carry numerous setæ, those on the basos being finely plumose.

The conical *telson* (fig. 11) is about as long as the last joint of the hind body, and bears spines on both sides on its distal half, the two terminal spines being hardly longer than those at the sides. The scape of the uropoda and its inner branches are uniformly spinous on their inner margins; the outer branch on its outer margin. Each terminates in a rather long spine.

Habitat. Bay of Islands; one mature female and three small immature females (two of them very minute) were taken by the dredge in 8 fathoms.

EXPLANATION OF THE PLATES.

PLATE XVI.

Cyclaspis levis.

- Fig. 1. Male, lateral view.
 2. The same, dorsal view.
 3. Portion of integument (highly magnified).
 4. Portion of antennary segment of female: a^1 , antennule; a^2 , rudimentary antennæ.
 5. Antenna of male.
 6. Mandible: a^1 , right side; a^2 , left side.

PLATE XVII.

Cyclaspis levis.

- Fig. 7. Maxilla, first pair. $\times 125$.
 8. Maxilla, second pair. $\times 125$.
 9. } Maxillipeds. $\times 125$.
 10. }

PLATE XVII. (*continued*).

Fig. 11. Palp of maxilliped.

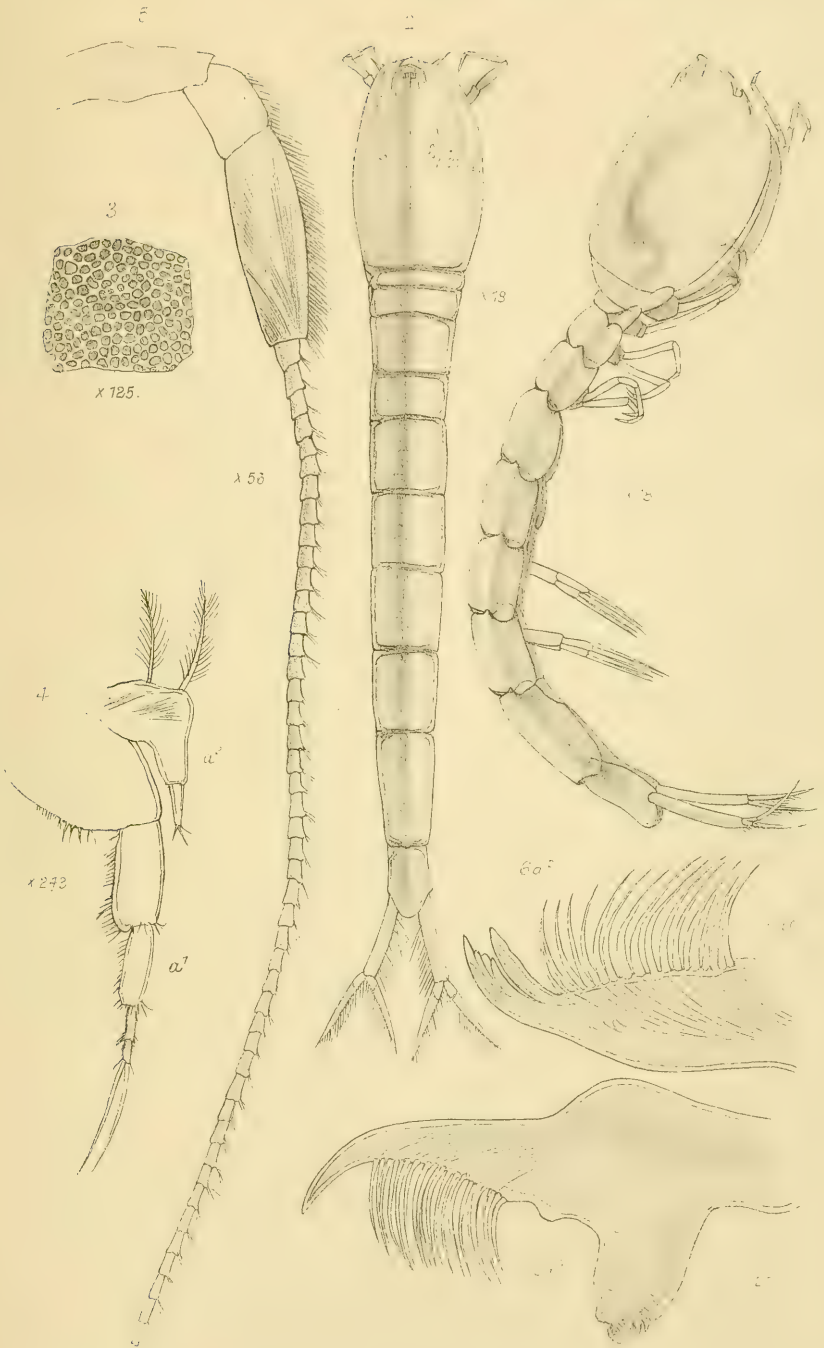
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| 12. Gnathopod of the first pair. | } In these figures the small letters
represent the following joints:—
<i>b</i> , basos; <i>i</i> , ischium; <i>m</i> , meros;
<i>c</i> , carpos; <i>p</i> , propodos; <i>d</i> , dactylos;
and <i>ex</i> , exopodite. |
| 13. Gnathopod of the second pair. | |
| 14. Extremity of second gnathopod. | |
| 15. Leg of the first pair. | |
| 16. Leg of the second pair. | |
| 17. Leg of third pair. ×56. | |
| 18. Leg of fourth pair. ×56. | |
| 19. Leg of fifth pair. ×56. | |
| 20. Pleopod of the first pair. ×56. | |
| 21. Pleopod of the second pair. ×56. | |
| 22. Pleopod of the third pair. ×56. | |
| 23. Pleopod of the fourth pair. ×56. | |
| 24. Pleopod of the fifth pair. ×56. | |
| 25. Uropoda. ×56. | |
| 26. Antennulæ. ×125. | |

PLATE XVIII.

Diastylis neo-zealanica, ad. ♀.

Fig. 1. Animal in lateral view.

2. Carapace and front part of body, from above.
 3. Portion of integument (highly magnified).
 4. Gnathopod of the first pair. ×43.
 5. Gnathopod of the second pair. ×43.
 6. Leg of the first pair. ×43.
 7. Leg of the second pair. ×43.
 8. Leg of the third pair. ×43.
 9. Leg of the fourth pair. ×43.
 10. Last segment of body, with telson and uropoda. ×18.
 11. The same (highly magnified).
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G.M. Thomson del.
F.H. Michael sculp.

Mincera Bros. imp.

NEW SPECIES OF COPEPOD NEW ZEALAND.





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